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(54) Title: AQUEOUS DISINFECTING CLEANING COMPOSITION

(57) Abstract

Aqueous disinfecting and cleaning compositions and concentrates which are efficacious against gram positive and gram negative bacteria, have relatively low volatile organic content ("VOC") and are surprisingly mild to the user of the compositions. The compositions include a quaternary ammonium compound as its primary germicidal active agent, have a low content of active constituents, and do not include organic solvents such as alcohols, glycols, or glycol ether in significant amounts.

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AQUEOUS DISINFECTING CLEANING COMPOSITION

The present invention relates to improvements in cleaning compositions. More particularly the present invention is directed to improved cleaning compositions which find particular use in hard surface cleaning and disinfecting applications.

Notwithstanding advantageous known art formulations, there yet remains a real and continuing need in the art for improved cleaning and disinfecting compositions in general, and in specific such compositions which provide at least one, but feature a plurality of the following characteristics: low volatile organic content, low irritancy to the end user of the composition, phase stability in storage, ease of fabrication, low cost, efficacy against gram positive bacteria, efficacy against gram negative bacteria, good cleaning characteristics, and relatively low percentages actives required in such an aqueous formulation.

The compositions of the invention are aqueous disinfecting and cleaning compositions and concentrates thereof which are effective cleaning compositions and are efficacious as disinfecting compositions against gram positive and gram negative bacteria, have relatively low volatile organic content ("VOC") and are mild to the user of the compositions. That these results are concurrently achieved with a composition which includes a quaternary ammonium compound as its primary germicidal active agent is surprising, and indicates a synergistic effect not apparent from the prior art. These compositions also provide good cleaning and disinfecting properties with low amounts of active constituents, and desirably do not include organic solvents such as low molecular weight alcohols, glycols or glycol ethers, in significant amounts, i.e., amounts in excess of about 1%wt and more.

In accordance with a first embodiment of the invention there is provided an aqueous disinfecting and cleaning composition in a concentrated form which comprises, but desirably consists essentially of:

a disinfecting effective amount of a quaternary ammonium compound having germicidal properties, desirably present in an amount of from about 0.001 - 5% wt.;

0.01 - 10%wt. of a nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer;

0.01 - 10%wt. of a further nonionic surfactant;

0 - 3%wt. of a polymeric cationic surfactant based on a polyquaternary ammonium salt;

0 - 3%wt. of a builder, desirably present in an amount of about 0.1 - 0.5%wt.;

optionally, minor amounts of up to about 5%wt. of one or more conventional additives particularly coloring agents, fragrances and fragrance solubilizers, viscosity modifying agents such as thickeners, pH adjusting agents and pH buffers including organic and inorganic salts; and,

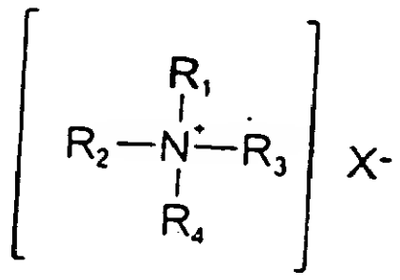
water to form 100%wt. of the concentrate form of the inventive compositions.

In accordance with a second embodiment of the invention there is provided an aqueous dilution of the concentrated disinfecting and cleaning composition described above, which provides effective cleaning and sanitization.

In a further embodiment of the invention there is provided a process for cleaning and/or disinfecting surfaces in need of such treatment which includes contacting a surface with a concentrate composition or aqueous dilution of a concentrate composition as taught herein.

In particularly preferred embodiments the concentrated disinfecting and cleaning compositions provided herein provide good cleaning, effective sanitization of surfaces particularly hard surfaces, and low irritancy to the consumer.

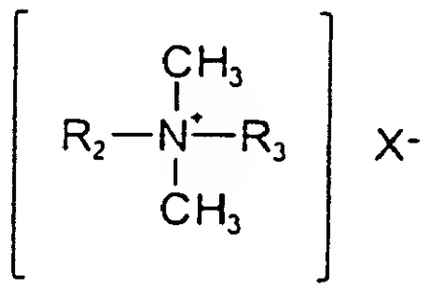
The compositions of the invention include a disinfecting effective amount of a quaternary ammonium compound having germicidal properties. Particularly useful quaternary ammonium compounds and salts thereof include quaternary ammonium germicides which may be characterized by the general structural formula:



where at least one of R_1, R_2, R_3 and R_4 is a hydrophobic, aliphatic, aryl aliphatic or aliphatic aryl radical of from 6 to 26 carbon atoms, and the entire cation portion of the molecule has a molecular weight of at least 165. The hydrophobic radicals may be long-chain alkyl, long-chain alkoxy aryl, long-chain alkyl aryl, halogen-substituted long-chain alkyl aryl, long-chain alkyl phenoxy alkyl, aryl alkyl, etc. The remaining radicals on the nitrogen atoms other than the hydrophobic radicals are substituents of a hydrocarbon structure usually containing a total of no more than 12 carbon atoms. The radicals R_1, R_2, R_3 and R_4 may be straight chained or may be branched, but are preferably straight chained, and may include one or more amide or ester linkages. The radical X may be any salt-forming anionic radical.

Exemplary quaternary ammonium salts within the above description include the alkyl ammonium halides such as cetyl trimethyl ammonium bromide, alkyl aryl ammonium halides such as octadecyl dimethyl benzyl ammonium bromide, N-alkyl pyridinium halides such as N-cetyl pyridinium bromide, and the like. Other suitable types of quaternary ammonium salts include those in which the molecule contains either amide or ester linkages such as octyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride, N-(laurylcocoaminoformylmethyl)-pyridinium chloride, and the like. Other very effective types of quaternary ammonium compounds which are useful as germicides include those in which the hydrophobic radical is characterized by a substituted aromatic nucleus as in the case of lauryloxyphenyltrimethyl ammonium chloride, cetylaminophenyltrimethyl ammonium methosulfate, dodecylphenyltrimethyl ammonium methosulfate, dodecylbenzyltrimethyl ammonium chloride, chlorinated dodecylbenzyltrimethyl ammonium chloride, and the like.

Preferred quaternary ammonium compounds which act as germicides and which are be found useful in the practice of the present invention include those which have the structural formula:



wherein R_2 and R_3 are the same or different C_8-C_{12}alkyl, or R_2 is C_{12-16}alkyl, C_{8-18}alkylethoxy, C_{8-18}alkylphenolethoxy and R_3 is benzyl, and X is a halide, for example

chloride, bromide or iodide, or X may be methosulfate. The alkyl groups recited in R_2 and R_3 may be straight chained or branched, but are preferably substantially linear.

Particularly useful quaternary germicides include compositions which include a single quaternary, as well as mixtures of two or more different quaternaries. Particularly useful examples include blends of alkyl dimethyl benzyl ammonium chlorides; dialkyl(C_8-C_{10})dimethyl ammonium chloride; didecyl dimethyl ammonium chloride; dioctyl dimethyl ammonium chloride; single alkyl dimethyl benzyl ammonium chloride compounds; alkyl dimethyl ethyl benzyl ammonium chloride; myristyl dimethyl benzyl ammonium chloride; methyl dodecyl benzyl ammonium chloride, methyl dodecyl xylene-bis-trimethyl ammonium chloride; benzethonium chloride. It is to be understood that these quaternary ammonium compounds may be used singly or in mixtures of two or more. These quaternary ammonium compounds are desirably present in the concentrate compositions in an amount of from about 0.001 - 5% wt., are desirably present in an amount of from 0.1 - 3%wt. and most desirably are present in an amount of from 0.5 – 3%wt. When diluted in a larger volume of water to form a cleaning and disinfecting composition, the quaternary ammonium compounds should be present in sufficient amount such that they are in a concentration of at least about 150 parts per million (p.p.m.), more desirably at least about 175 p.p.m. and most desirably about 200 p.p.m. The present inventors have surprisingly found that certain of their formulations exhibited effective cleaning and disinfecting with less than 200 p.p.m. of the quaternary ammonium compounds in cleaning compositions which is an amount below which is generally believed to be necessary for disinfecting efficacy.

A further constituent of invention is a nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer. Polymeric alkylene oxide block copolymers include nonionic surfactants in which the major portion of the molecule is made up of block polymeric C_2-C_4 alkylene oxides. Such nonionic surfactants, while preferably built up from an alkylene oxide chain starting group, and can have as a starting nucleus almost any active hydrogen containing group including, without limitation, amides, phenols, thiols and secondary alcohols.

One group of such useful nonionic surfactants containing the characteristic alkylene oxide blocks are those which may be gencrally represented by the formula (A):

$$HO—(EO)_x(PO)_y(EO)_z—H \qquad (A$$

where EO represents ethylene oxide,

PO represents propylene oxide,

y equals at least 15,

$(EO)_{x+z}$ equals 20 to 50% of thc iotal weight of said compounds; and,

the total molecular weight is preferably in the range of about 2000 to 15,000.

Another group of nonionic surfactants appropriate for use in the new compositions can be represented by the formula (B):

$$R—(EO,PO)_a(EO,PO)_b—H \qquad (B$$

wherein R is an alkyl, aryl or aralkyl group, where the R group contains 1 to 20 carbon atoms, the weight percent of EO is within the range of 0 to 45% in one of the blocks a, b, and within the range of 60 to 100% in the other of the blocks a, b, and the total number of moles of combined EO and PO is in the range of 6 to 125 moles, with 1 to 50 moles in the PO rich block and 5 to 100 moles in the EO rich block.

Further nonionic surfactants which in general are encompassed by Formula B include butoxy derivatives of propylene oxide/ethylene oxide block polymers having molecular weights within the range of about 2000-5000.

Still further uscful nonionic surfactants containing polymcric butoxy (BO) groups can be representcd by formula (C) as follows:

$$RO—(BO)_n(EO)_x—H \qquad (C$$

wherein R is an alkyl group containing 1 to 20 carbon atoms,

n is about 5-15 and *x* is about 5-15.

Also useful as the nonionic block copolymcr surfactants, which also include polymeric butoxy groups, are those which may be reprcsented by thc following formula (D):

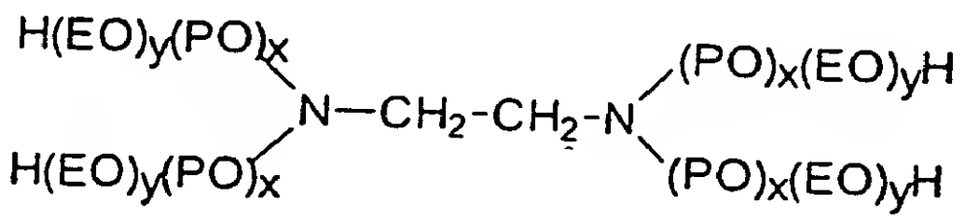
$$HO—(EO)_x(BO)_n(EO)_y·H \qquad (D)$$

wherein n is about 5-15, preferably about 15,

x is about 5-15, preferably about 15, and

y is about 5-15, preferably about 15.

Still further useful nonionic block copolymer surfactants include ethoxylated derivatives of propoxylated ethylene diamine, which may be represented by the following formula:



(E

where (EO) represents ethoxy,

(PO) represents propoxy,

the amount of $(PO)_x$ is such as to provide a molecular weight prior to ethoxylation of about 300 to 7500. and the amount of $(EO)_y$ is such as to provide about 20% to 90% of the total weight of said compound.

Of these, the most preferred are those which are represented by formula (A) above; specific examples of which include those materials presently commercially available under the tradename "Pluronic®", and in particular the Pluronic® F series, Pluronic® L series, Pluronic® P series, as well as in the Pluronic® R series, each of which are generally described to be block copolymers of propylene oxide and ethylene oxide. Generally those of the Pluronic® L series and the Pluronic® R series are preferred as these are supplied in liquid form by the manufacturer and are readily formulated into the present inventive compositions. These are also available in a wide range of HLB values, and those having HLB values in the range of 1.0 - 23.0 may be used, although those with intermediate HLB values such as from about 12.0 - 18.0 are found to be particularly advantageous. These materials are presently commercially available from BASF AG (Ludwigshafen, Germany).

Other useful exemplary nonionic block copolymers based on a polymeric ethoxy/propoxy units which may also be used include those presently commercially available in the Poly-Tergent® E, and Poly-Tergent® P from Olin Chemicals Corp., (Stamford CT).

It is to be understood that these nonionic surfactants based on polymeric alkylene oxide block copolymers may be used singly or in mixtures of two or more such compounds. These nonionic surfactant compounds are desirably present in the

concentrate compositions in an amount of from about 0.01 - 10%wt., desirably in an amount of 0.1 - 4%wt. and most desirably in an amount of 1 – 4%wt.

The present inventive compositions also include a nonionic surfactant. Preferred nonionic surfactants provide surprisingly good levels of cleaning performance, particularly in conjunction with the preferred quaternary ammonium compounds described herein. Very desirably, the nonionic surfactant further exhibits a low level of irritancy to the eyes.

One class of nonionic surfactants are alkoxylated alcohols. These include the condensation products of a higher alcohol (e.g., an alkanol containing about 8 to 18 carbon atoms in a straight or branched chain configuration) condensed with about 2 to 30 moles of ethylene oxide, for example, lauryl or myristyl alcohol condensed with about 16 moles of ethylene oxide, tridecanol condensed with about 6 to moles of ethylene oxide, myristyl alcohol condensed with about 10 moles of ethylene oxide per mole of myristyl alcohol, the condensation product of ethylene oxide with a distillation or separation fraction of coconut fatty alcohol containing a mixture of fatty alcohols with alkyl chains varying from 10 to about 14 carbon atoms in length and wherein the condensate contains either about 6 moles of ethylene oxide per mole of total alcohol or about 9 moles of ethylene oxide per mole of alcohol and tallow alcohol ethoxylates containing 6 ethylene oxide to 11 ethylene oxide per mole of alcohol.

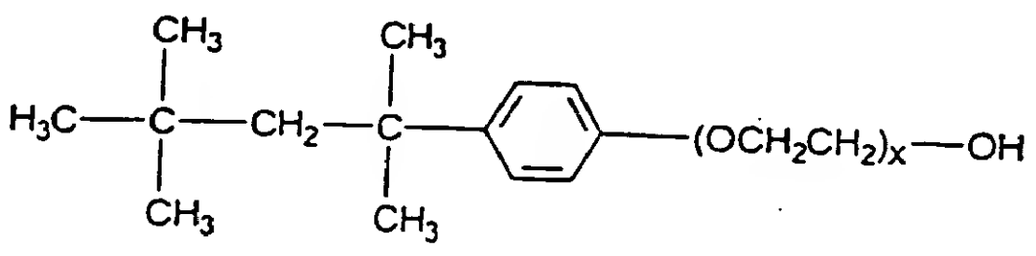
A preferred group of the foregoing nonionic surfactants are the Neodol® alcohol ethoxylates (Shell Chemical Co., Houston TX); which are higher aliphatic, primary alcohols containing about 9-15 carbon atoms condensed with ethylene oxide, generally about 6 –13 moles of ethylene oxide per molecule.

Additional useful nonionic surfactants include those based on alcohol and ethylene oxide condensates of a secondary aliphatic alcohol. These alcohols contain 8 to 18 carbon atoms in a straight or branched chain configuration and are condensed with 5 to 30 moles of an alkylene oxide, especially ethylene oxide. Examples of these include the Tergitol® secondary alcohol ethoxylates (Union Carbide Corp., Danbury CT).

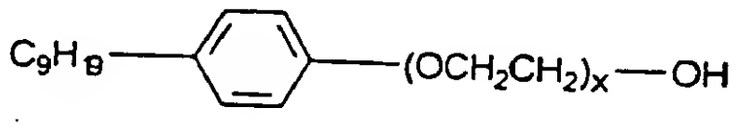
Further useful nonionic surfactants include certain alkoxylated linear aliphatic alcohol surfactants which are believed to be the condensation products of a C_8-C_{10}

hydrophilic moiety with alkylene oxides, especially polyethylene oxide and or polypropylene oxide moieties. Such alkoxylated linear alcohol surfactants are presently commercially available under the tradename PolyTergent® (Olin Chemical Co., Stamford CT). Of these particularly useful are those which are marketed as PolyTergent® SL-22, PolyTergent® SL-42, PolyTergent® SL-62 and PolyTergent® SL-29, of which PolyTergent® SL-62 is particularly advantageous. PolyTergent® SL-62 is described as being a moderately foaming, biodegradable alkoxylated linear alcohol surfactant having on average 8 moles of oxyethylene groups per molecule. These alkoxylated linear alcohol surfactants provide good detersive action in the removal of many types of fats and greases such as are frequently found in soils on hard surfaces, as well as providing a further solubilizing effects and may be included in the concentrate compositions according to the present invention with advantage. The preferred alkoxylated linear alcohol surfactants also exhibit low levels of ocular irritation in the concentrate compositions.

Further useful nonionic surfactants include alkoxylated, and particularly ethoxylated octyl and nonyl phenols according to the following general structural formulas:



or,



in which the C_9H_{19} group in the latter formula is a mixture of branched chained isomers. In both formulae, x indicates an average number of ethoxy units in the side chain. Suitable non-ionic ethoxylated octyl and nonyl phenols include those having from about 7 to about 13 ethoxy units. Such compounds are commercially available under the trade name Triton® X (Union Carbide, Danbury CT).

Exemplary alkoxylated alkyl phenols useful as a nonionic surfactant also include certain compositions presently commercially available from the Rhône-Poulenc Co., (Cranbury, NJ) under the general trade name Igepal®, which are

described to be octyl and nonyl phenols. These specifically include Igepal® CO730 which is described as an ethoxylated nonyl phenol having an average of 15 ethoxy groups per molecule.

A further useful class of nonionic surfactants are those based on alkylpolyglycosides. Suitable alkyl mono and polyglycosides are prepared generally by reacting a monosaccharide, or a compound hydrolyzable to a monosaccharide with an alcohol such as a fatty alcohol in an acid medium.

A preferred group of alkyl glycoside surfactants suitable for use in the practice of this invention may be represented by formula I below:

$$RO—(R_1O)_y-(G)_xZ_b$$

wherein:

R is a monovalent organic radical containing from about 6 to about 30, preferably from about 8 to about 18 carbon atoms;

R_1 is a divalent hydrocarbon radical containing from about 2 to about 4 carbon atoms, especially ethyl and propyl radicals;

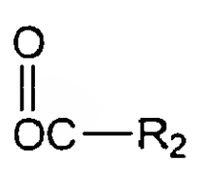
O is an oxygen atom;

y is a number which has an average value from about 0 to about 1 and is preferably 0;

G is a moiety derived from a reducing saccharide containing 5 or 6 carbon atoms; and

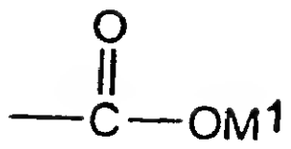
x is a number having an average value from about 1 to 5 (preferably from 1.1 to 2);

Z is selected O_2M^1,



$O(CH_2)$, CO_2M^1, OSO_3M^1, or $O(CH_2)SO_3M^1$; R_2 is $(CH_2)CO_2M^1$ or $CH=CHCO_2M^1$; with the proviso that Z can be O_2M^1 only if Z is in place of a primary hydroxyl group in which the primary hydroxyl-bearing carbon atom,

$—CH_2OH$, is oxidized to form a



group);

b is a number of from 0 to 3x+1 preferably an average of from 0.5 to 2 per glycosal group;

p is 1 to 10,

M^1 is H^+ or an organic or inorganic cation, such as, for example, an alkali metal, ammonium, monoethanolamine, or calcium.

As defined in Formula I above, R is generally the residue of a fatty alcohol having from about 8 to 30 and preferably 8 to 18 carbon atoms. Examples of such alkylglycosides as described above include, for example, APG™ 325 CS GLYCOSIDE which is described as being a 50% C_9-C_{11} alkyl polyglycoside, also commonly referred to as D-glucopyranoside, (commercially available from Henkel Corp, Ambler PA) and GLUCOPON™ 625 CS which is described as being a 50% C_{10}-C_{16} alkyl polyglycoside, also commonly referred to as a D-glucopyranoside, (available from Henkel Corp., Ambler PA).

These nonionic surfactant compounds described above may be used singly or in mixtures. They comprise 0.01 - 10%wt. of the concentrate compositions, desirably comprise 0.1 - 7%wt. and most desirably comprise about 2.5-6%wt. and especially about 5%wt. of the concentrate compositions taught herein.

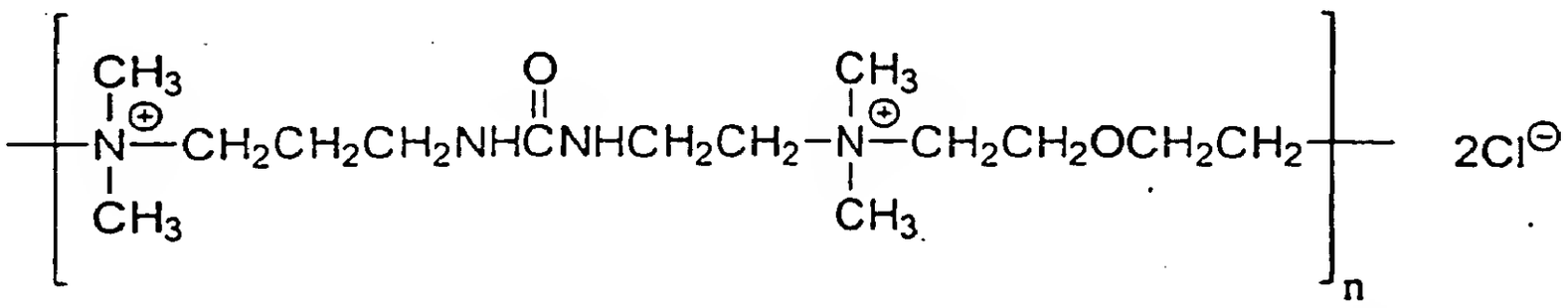
The inventive compositions optionally but desirably include a builder. Such a builder constituent may be present in an amount of from 0 - 3%wt. based on the total weight of the concentrate compositions taught herein. Such include water soluble inorganic builders which can be used alone, in admixture with other water soluble inorganic builders, as well as in conjunction with one or more organic alkaline sequestrant builder salts.

Exemplary builders include alkali metal carbonates, phosphates, polyphosphates and silicates, including sodium carbonate and sodium sesquicarbonate. Further exemplary builders include organic alkaline sequestrant builder salts such as alkali metal polycarboxylates including water-soluble citrates such as sodium and potassium citrate, sodium and potassium tartarate, sodium and potassium ethylenediaminetetraacetate, sodium and potassium N-(2-hydroxyethyl)-

ethylene diamine triacetates, sodium and potassium nitrilotriacetates, as well as sodium and potassium tartrate mono- and di-succinates. Also useful are gluconate or glucoheptonate salts particularly sodium gluconate and sodium glucoheptonate. Particularly advantageously used are di-, tri- and tetrasodium salts of ethylenediaminetetraacetic acid, especially tetrasodium salts thereof. As noted, these organic builder salts may be used individually, as a combination of two or more organic builder salts, as well as in conjunction with one or more detergency builders, including those indicated above.

As is noted above, the compositions according to the invention are aqueous in nature. Water is added to the constituents in order to provide 100% by weight of the composition.

An optional but particularly desirable further constituent is a cationic polymeric polyquaternary ammonium salt, especially a halogen salt such as a chloride salt. Such a material is one which includes at least one repeating monomer unit wherein such monomer includes as part of its structure a quaternary ammonium. A particularly useful class of such materials are those sold under the trade designation "Mirapol®" and are available from Rhône-Poulenc Surfactant & Specialty Chemicals Co. (Cranbury, NJ). These materials are highly cationic in nature, and are believed to be in accordance with the following general structure:



wherein n is an integer or 2 or greater, and is desirably in the range of 2 - 12, more desirably is about 6. Such a material is commercially available as Mirapol® A-15 from from Rhône-Poulenc, identified above.

The inventors have found that the inclusion of such material provides a useful soil suspending benefit which is desirable from a cleaning standpoint, although it has also been observed by the inventors that inclusion of such a material may have a detrimental effect on the disinfecting properties of the compositions. Thus, their inclusion in the compositions and use is to be carefully chosen and in effective

amounts to be determined in view of the inventive teaching presented herein, particularly as demonstrated in one or more of the Example formulations.

The constituents which may be used in the compositions according to the invention are known, and are commercially available from a number of sources.

The compositions according to the invention are useful in the disinfecting and/or cleaning of surfaces, especially hard surfaces in need of such treatment. These in particular include surfaces wherein the presence of gram positive and/or gram negative bacteria are suspected. In accordance with the present inventive process, cleaning and/or disinfecting of such surfaces comprises the step of applying a stain releasing and a disinfecting effective amount of a composition as taught herein to such a stained surface. Afterwards, the compositions are optionally but desirably wiped, scrubbed or otherwise physically contacted with the hard surface, and further optionally, may be subsequently rinsed from such a cleaned and disinfected hard surface.

Such a hard surface cleaning and disinfecting composition according to the invention is may be provided as a ready to use product which may be directly applied to a hard surface, but is desirably provided in a concentrated form intended to be diluted in water to form a cleaning composition therefrom.

The hard surface cleaner composition provided according to the invention can also be provided as a ready to use product in a manually operated spray dispensing container. In a yet a further embodiment, the compositions according to the invention may be formulated so that it may be useful in conjunction with a "aerosol" type product wherein it is discharged from a pressurized acrosol container.

Nothing in the specification shall be also understood to limit the forming of a "super-concentrated" cleaning composition based upon the composition described above. Such a super-concentrated composition is essentially the same as the compositions described above except in that they include a lesser amount of water.

While the cleaning compositions are most beneficial for use in their form, i.e., their form as described above, they may also be diluted to form a cleaning composition therefrom. Such cleaning compositions may be easily prepared by diluting measured amounts of the compositions in further amounts of water by the consumer or other end user in certain weight ratios of composition:water, and

optionally, agitating the same to ensure even distribution of the composition in the water. The concentrate compositions according to the invention may be used without further dilution, but may also be used with a further aqueous dilution, i.e., in concentrate composition:water concentrations of 1:0, to extremely dilute dilutions such as 1:1000. When subjected to further aqueous dilution, such a dilution is preferably a weight or volume ratio proportion of from 1:10 - 1:64, and most desirably is about 1:64. The actual dilution selected is in part determinable by the degree and amount of dirt and grime to be removed from a surface(s), the amount of mechanical force imparted to remove the same, as well as the observed efficacy of a particular dilution. Generally better results and faster removal is to be expected at lower relative dilutions of the composition and the water.

Other conventional optional additives, although not particularly elucidated herein may also be included in the present inventive compositions. Exemplary optional conventional additives include but are not limited to: pH adjusting agents and pH buffers including organic and inorganic salts; non-aqueous solvents, perfumes, perfume carriers, optical brighteners, coloring agents such as dyes and pigments, opacifying agents, hydrotropes, antifoaming agents, viscosity modifying agents such as thickeners, enzymes, anti-spotting agents, anti-oxidants, anti-corrosion agents as well as others not specifically elucidated here. These should be present in minor amounts, preferably in total comprise less than about 5% by weight of the compositions, and desirably less than about 3%wt.

The following examples below illustrate exemplary and preferred formulations of the concentrate composition according to the instant invention.

Throughout this specification and in the accompanying claims, weight percents of any constituent are to be understood as the weight percent of the active portion of the referenced constituent, unless otherwise indicated.

Example Formulations:

Preparation of Example Formulations:

Exemplary formulations illustrating certain preferred embodiments of the inventive compositions and described in more detail in Table 1 below were formulated generally in accordance with the following protocol.

Into a suitably sized vessel, a measured amount of water was provided after which the constituents were added in no specific or uniform sequence, which indicated that the order of addition of the constituents was not critical. All of the constituents were supplied at room temperature, and any remaining amount of water was added thereafter. Certain of the nonionic surfactants were gelled at room temperature and were first preheated to render them pourable liquids prior to addition and mixing. Mixing of the constituents was achieved by the use of a mechanical stirrer with a small diameter propeller at the end of its rotating shaft. Mixing, which generally lasted from 5 minutes to 120 minutes was maintained until the particular exemplary formulation appeared to be homogeneous. The exemplary compositions were readily pourable, and retained well mixed characteristics (i.e., stable mixtures) upon standing for extend periods, even in excess of 120 days.

The exact compositions of the example formulations are listed on Table 1, below where are described the weights of the actives provided in the named constituent is indicated.

Table 1										
Example:	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Ex.8	Ex.9	Ex.10
Mirapol A-15	0.25	0.25	0.25	0.25	0.25	0.25	0.25		0.25	
Pluronic L-64	6.00	2.00	4.00	4.00	6.00	5.00	2.00	2.00	2.00	2.00
Neodol 23-6.5	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	4.00	4.00
Neodol 25-7										
Neodol 91-2.5										
Tergitol 15-S-9										
other nonionic surfactants										
sodium carbonate										
sodium sesquicarbonate										
sodium citrate										
EDTA sodium salt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BTC-8358	2.50	1.25	1.25	2.50	1.25	2.00	2.00	2.00	2.00	2.00
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

Table 1

Example:	Ex.11	Ex.12	Ex.13	Ex.14	Ex.15	Ex.16	Ex.17	Ex.18	Ex.19	Ex.20
Mirapol A-15	0.25									
Pluronic L-64	2.00	2.00	1.28	6.00	4.00	4.00	4.00	4.00	4.00	4.00
Neodol 23-6.5	8.00	8.00		2.00	2.00	2.00	2.00	2.00	2.00	2.00
Neodol 25-7			4.00							
Neodol 91-2.5										
Tergitol 15-S-9										
other nonionic surfactants										
sodium carbonate						1.00	2.00	3.00		
sodium sesquicarbonate										
sodium citrate										
EDTA sodium salt	1.00	1.00	0.15	0.15					0.50	1.00
BTC-8358	2.00	2.00	1.28	2.00	1.30	1.30	1.30	1.30	1.30	1.30
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

Table 1

Example:	Ex.21	Ex.22	Ex.23	Ex.24	Ex.25	Ex.26	Ex.27	Ex.28	Ex.29	Ex.30
Mirapol A-15			0.50	1.00		0.50	1.00		0.50	
Pluronic L-64	4.00	2.00	2.00	2.00	4.00	4.00	4.00	2.00	2.00	2.00
Neodol 23-6.5	2.00									
Neodol 25-7		4.00	4.00	4.00	2.00	2.00	2.00	8.00	8.00	7.00
Neodol 91-2.5										
Tergitol 15-S-9										
other nonionic surfactants										
sodium carbonate	0.50									
sodium sesquicarbonate										
sodium citrate										
EDTA sodium salt	0.50							0.10	0.10	0.10
BTC-8358	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

Table 1

Example:	Ex.31	Ex.32	Ex.33	Ex.34	Ex.35	Ex.36	Ex.37	Ex.38	Ex.39	Ex.40
Mirapol A-15	0.50	0.13	0.50	0.50	0.75	0.50	0.50	0.50		
Pluronic L-64	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Neodol 23-6.5										
Neodol 25-7	7.00	6.00	6.00	5.00	5.00		6.00	6.00	5.00	6.00
Neodol 91-2.5										
Tergitol 15-S-9						5.00				
other nonionic surfactants										
sodium carbonate										
sodium sesquicarbonate										
sodium citrate										
EDTA sodium salt	0.10	0.10	0.10	0.10	0.10	0.10	0.38	1.00	0.10	0.10
BTC-8358	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

Table 1

Example:	Ex.41	Ex.42	Ex.43	Ex.44	Ex.45	Ex.46	Ex.47	Ex.48	Ex.49	Ex.50
Mirapol A-15										
Pluronic L-64	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Neodol 23-6.5										
Neodol 25-7		5.00	5.00	5.00	3.50	6.00	5.00	5.00	5.00	5.00
Neodol 91-2.5					1.50					
Tergitol 15-S-9	5.00									
other nonionic surfactants										
sodium carbonate										
sodium sesquicarbonate										
sodium citrate			0.50	0.50	0.50	0.50	0.50			
EDTA sodium salt	0.10	0.10						0.10	0.10	0.10
BTC-8358	1.30	1.14	1.14	1.30	1.30	1.30	0.98	1.30	1.30	1.30
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

Table 1

Example:	Ex.51	Ex.52	Ex.53	Ex.54	Ex.55	Ex.56	Ex.57	Ex.58	Ex.59	Ex.60
Mirapol A-15				0.50		0.25	0.25	0.25	0.25	0.25
Pluronic L-64	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Neodol 23-6.5										
Neodol 25-7	5.00	5.00	5.00	6.00	6.00					
Neodol 91-2.5										
Tergitol 15-S-9										
other nonionic surfactants						2.50 APG 325	0.40 Pluronic L-64 and 3.60 Pluronic P103	5.00	3.00 Neodol 91-2.5 and 3.00 Neodol 91-6	6.00 Neodol 25-9
sodium carbonate										
sodium sesquicarbonate				1.00	1.00					
sodium citrate										
EDTA sodium salt	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
BTC-8358	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

Table 1

Example:	Ex.61	Ex.62	Ex.63	Ex.64	Ex.65	Ex.66	Ex.67	Ex.68	Ex.69	Ex.70	Ex.71
Mirapol A-15	0.25	0.25	0.25	0.25	0.25						
Pluronic L-64	2.00	2.00	2.00	2.00	2.00	1.28	2.00	2.00	2.00	4.00	4.00
Neodol 23-6.5											
Neodol 25-7					6.00	4.00					
Neodol 91-2.5											
Tergitol 15-S-9											
other nonionic surfactants	5.00 Surfonic N95	6.00 Neodol 1-7	5.00 Igepal CO730	5.00 Triton X-100			5.00 PolyTergent SL-62	5.00 PolyTergent SL-62	5.00 PolyTergent SL-62	5.00 PolyTergent SL-62	4.00 PolyTergent SL-62
sodium carbonate											
sodium sesquicarbonate											
sodium citrate											
EDTA sodium salt	0.10	0.10	0.10	0.10	0.10	0.15	0.10	0.10	0.10	0.10	0.10
BTC-8358	1.30	1.30	1.30	1.30	1.30	1.28	1.30	1.20	1.10	1.15	1.15
fragrance (+dye)	0.20	0.20	0.20	0.20	0.20	0.20	0.40	2.0	2.0	0.40	0.40
DI water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

APG 325 which is described as a nonionic alkylpolyglucoside surfactant (Henkel Corp., Gulph Mills, PA)
Pluronic L-64 described previously
Pluronic P103 described to be a nonionic surfactant based on block ethoxy/propoxy copolymers
Surfonic N95 described to be a nonionic nonylphenol surfactant
Igepal CO730 described to be a nonionic nonylphenol surfactant
PolyTergent SL-62 is described to be a nonionic alkoxylated linear alcohol surfactant

As is indicated, to all of the formulations of Table 1 was added sufficient deionized water in "quantum sufficient" to provide 100 parts by weight of a particular formulation.

The identity of the constituents of Table 1 above are described in more detail on Table 2, below.

TABLE 2

constituent:	identity:
Mirapol® A-15	cationic polymeric polyquaternary ammonium compound (Rhône-Poulenc Inc.)
Pluronic® L-64	nonionic ethoxy/propoxy block copolymer surfactant (BASF Corp.)
Neodol® 23-6.5	nonionic C12-13 alkanol condensed with 6.5 moles ethylene oxide (Shell Chemical Co.)
Neodol® 25-7	nonionic C12-15 alkanol condensed with 7 moles ethylene oxide (Shell Chemical Co.)
Neodol® 91-2.5	nonionic C9-11 alkanol condensed with an average of 2.5 moles ethylene oxide (Shell Chemical Co.)
Tergitol® 15-S-9	nonionic C11-15 alkanol condensed with 8 moles of ethylene oxide (Union Carbide Corp.)
sodium sesquicarbonate	sodium sesquicarbonate
sodium citrate	sodium citrate, anhydrous
sodium carbonate	sodium carbonate monohydrate
EDTA sodium salt	sodium salt of ethylene diamine tetraacetic acid (Dow Chemical Co.)
BTC-8358	alkyl dimethyl benzyl ammonium chloride
Fragrance	proprietary composition

It is to be noted that the formulations according to Examples 48 - 53 were substantially the same, but for different dyes and/or fragrances which varied between these formulations.

Evaluation of Antimicrobial Efficacy:

Several of the exemplary formulations described in more detail on Table 1 above were evaluated in order to evaluate their antimicrobial efficacy against *Staphylococcus aureus* (gram positive type pathogenic bacteria) (ATCC 6538), *Salmonella choleraesuis* (gram negative type pathogenic bacteria) (ATCC 10708), and *Pseudomonas aeruginosa* (ATCC 15442). The testing was performed in accordance with the protocols outlined in "Use-Dilution Method", Protocols 955.14,

955.15 and 964.02 described in Chapter 6 of "Official Methods of Analysis", 16th Edition, of the Association of Official Analytical Chemists; "Germicidal and Detergent Sanitizing Action of Disinfectants", 960.09 described in Chapter 6 of "Official Methods of Analysis", 15th Edition, of the Association of Official Analytical Chemists; or American Society for Testing and Materials (ASTM) E 1054-91 the contents of which are herein incorporated by reference. This test is also commonly referred to as the "AOAC Use-Dilution Test Method".

As is appreciated by the skilled practitioner in the art, the results of the AOAC Use-Dilution Test Method indicates the number of test substrates wherein the tested organism remains viable after contact for 10 minutes with at test disinfecting composition / total number of tested substrates (cylinders) evaluated in accordance with the AOAC Use-Dilution Test. Thus, a result of "0/60" indicates that of 60 test substrates bearing the test organism and contacted for 10 minutes in a test disinfecting composition, 0 test substrates had viable (live) test organisms at the conclusion of the test. Such a result is excellent, illustrating the excellent disinfecting efficacy of the tested composition. Results for lesser amount of test substrates such as for 10, 20, 30 or 40 test substrates provide useful screening results, although insufficient to satisfy the requirement of 60 test substrates as dictated by the AOAC Use-Dilution Test.

Results of the antimicrobial testing are indicated on Table 3, below. The reported results indicate the number of test cylinders with live test organisms/number of test cylinders tested for each example formulation and organism tested.

TABLE 3			
Formulation:	*Staphylococcus aureus*	*Salmonella choleraesuis*	*Pseudomonas aeruginosa*
Ex.1	0/60	0/60	2/60
Ex.2	1/60	1/70	---
Ex.3	0/60	2/90	---
Ex.4	0/60	0/60	---
Ex.6	1/60	0/60	---
Ex.7	0/60	0/60	---
Ex.8	0/60	0/60	---
Ex.10	0/40	0/40	---
Ex.13	0/30	0/30	---
Ex.14	0/30	0/30	---
Ex.32	---	15/20	---
Ex.34	0/30	21/30	---
Ex.36	0/30	20/30	---
Ex.54	---	0/10	---
Ex.37	---	0/10	---
Ex.38	---	0/10	---
Ex.39	0/30	0/30	---
Ex.40	---	0/20	---
Ex.41	0/30	0/30	---
Ex.55	0/20	0/20	---
Ex.42	0/20	0/20	---
Ex.43	0/20	0/20	---
Ex.44	0/20	0/20	---
Ex.45	1/40	0/40	---
Ex.49	0/60	0/60	---
Ex.51	0/60	0/60	---
Ex.52	1/60	0/60	---
Ex.53	0/60	0/60	---
Ex.68	0/10	---	---
Ex.69	0/10	---	---
Ex.70	0/10	---	---
Ex.71	0/10	---	---

"—" indicates not tested

Evaluation of Ocular Irritation:

The ocular irritation characteristics of formulations according to the invention were evaluated using the known Draize Eye test protocol. Evaluation was performed on several formulations according to the invention and described more fully in Table I above.

As known to those skilled in the art, the Draize Eye Test measures eye irritation for the grading of severity of ocular lesions, measuring three dimensions:

scores obtained for the cornea, iris and conjunctiva. The results of the Draize test are reported below. These indicate that an EPA classification Category "3" was appropriate, where corneal involvement or irritation cleared in "21" days or less. These results are in accordance with the guidelines of the Environmental Protection Agency (EPA), 40 C.F.R. Ch.1, §162.10, (1986).

TABLE 4

Formulation:	Corneal opacity in test subjects / number of days
Ex.1	0 / 21
Ex.6	2 / 21
Ex.13	0 / 21
Ex.14	1 / 21
Ex.39	0 / 21

Evaluation of Cleaning Efficacy:

Various formulations amongst those listed above were evaluated for their cleaning efficacy on tile surfaces utilizing the following protocols. "Standard soiled tiles" were prepared for use in the tests. These were prepared in accordance with the protocol described in ASTM 4488-87, Annex A2 "Greasy Soil/Painted Masonite Wallboard Test Method" as well as Annex A5 "Particulate and Oily Soil/Vinyl Tiles Test Method". This preparation of standard soiled tiles and cleaning protocol was performed for a number of cleaning compositions formed from the formulations described in more detail on Table 1.

Evaluation was performed utilizing a Gardner Washability Apparatus, using a standard soil tiles prepared in accordance with the protocol described above at a standard pressure and sponge stroke settings in order to determine or quantify the cleaning efficiency of the formulations. These formulations were used formed into a cleaning composition wherein 1 part of a formulation of Table 1 was diluted with 64 parts water. For comparative purposes, a 1:64 dilution of a commercially available concentrated cleaning and disinfecting preparation, Lysol® Deodorizing Cleaner - "Country Scent" variety was also prepared and evaluated in the same test. In determining the cleaning efficiency of each of the formulations, reflectance values were determined using a Minolta Chromameter where each tile was measured three times and the mean reflectance value are reported below on Table 5. For each of these

tiles, there were at least four replicates, each of which were evaluated and used to determine the mean reflectance value of Table 5. Testing was performed for each of the following: a clean unsoiled tile, a soiled tile, and a soiled tile following Gardner Washability Apparatus scrubbing. Such reflectance values were then employed to calculate cleaning efficiency according to the following formula:

$$\text{Cleaning Efficiency} = \frac{Lt - Ls}{Lo - Ls}$$

wherein:

Lt = reflectance average after scrubbing solid tile;

Ls = reflectance average before cleaning soiled tile;

Lo = reflectance average original tile before soiling.

The evaluation procedure noted above was performed in groups of test tiles, wherein the cleaning compositions formed from formulations according to Table 1 were compared to a tiles treated with the cleaning composition formed using the Lysol® Deodorizing Cleaner "Country Scent" formulation. These cleaning efficiency results are shown in the Table 5, following.

TABLE 5

Formulation:	Greasy	Oily
Group A		
Lysol® Country Scent	0.61	0.75
Ex.1	0.59	0.87
Ex.2	0.56	0.77
Ex.3	0.61	0.76
Ex.4	0.61	0.87
Ex.6	--	0.87
Ex.7	--	.0.83
Ex.8	--	0.77
Ex.9	--	0.83
Ex.10	--	0.79
Ex.11	--	0.78
Ex.12	--	0.75
Group B		
Lysol® Country Scent	--	0.63
Ex. 66	--	0.53
Ex.14	--	0.57
Group C		
Lysol® Country Scent	--	0.73
Ex.15	--	0.64
Ex.16	--	0.7
Ex.17	--	0.6
Ex.18	--	0.64
Ex.19	--	0.68
Ex.20	--	0.6
Ex.21	--	0.57
Group D		
Lysol® Country Scent	--	0.72
Ex.22	--	0.58
Ex.23	--	0.56
Ex.24	--	0.75
Ex.25	--	0.42
Ex.26	--	0.66
Ex.27	--	0.66

Group E		
Lysol® Country Scent	--	0.76
Ex.28	--	0.68
Ex.29	--	0.75
Ex.30	--	0.72
Ex.31	--	0.81
Ex.33	--	0.85
Ex.34	--	0.85
Ex.35	--	0.84
Ex.39	--	0.81
Ex.40	--	0.78
Group F		
Lysol® Country Scent	--	0.57
Ex.56	--	0.21
Ex.57	--	0.46
Ex.58	--	0.71
Ex.59	--	0.73
Ex.60	--	0.74
Ex.61	--	0.77
Ex.62	--	0.80
Ex.63	--	0.80
Ex.64	--	0.82

As shown, the measurement of the cleaning effectiveness of the test samples involved the ability of the cleaning composition to remove the test soil from the test substrate. This was expressed by Cleaning Efficiency; as numerical values for a Cleaning Efficiency increase, higher cleaning effectiveness is achieved for the cleaning composition tested. As the results show, the inventive composition showed excellent cleaning characteristics which favorably compare to the commercially available products.

Claims:

1. An aqueous disinfecting and cleaning concentrate composition which comprises per 100%wt.,
a disinfecting effective amount of a quaternary ammonium compound having germicidal properties;
0.01-10%wt. of a nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer;
0.01 – 10%wt. of a further nonionic surfactant;
0 – 3%wt. of a builder;
0 - 5%wt. of one or more conventional additives; and
water up to 100%wt.

2. The concentrate composition according to claim 1 whercin the quaternary ammonium compound having germicidal properties is present in an amount of from about 0.001 - 5% wt.

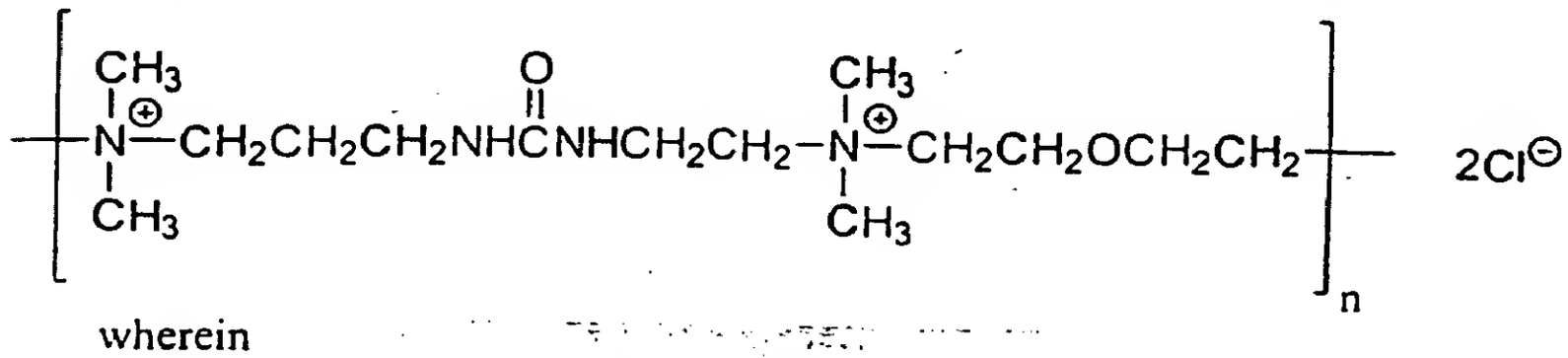
3. The aqueous disinfecting and cleaning concentrate composition according to claim 1 wherein the nonionic surfactant compound based on a block polymeric alkylene oxide block is present in an amount of from about 0.1% - 4%wt

4. The aqueous disinfecting and cleaning concentrate composition according to claim 3 wherein the nonionic surfactant compound based on a block polymeric alkylene oxide block is a compound according to the formula:

$$HO—(EO)_x(PO)_y(EO)_z—H \qquad (A$$

where EO represents ethylene oxide,
PO represents propylene oxide,
y equals at least 15,
$(EO)_{x+z}$ equals 20 to 50% of the total weight of said compounds, and,
the total molecular weight is preferably in the range of about 2000 to 15,000.

5. The aqueous disinfecting and cleaning concentrate composition according to claim 1 wherein polymeric cationic surfactant compound based on a polyquaternary ammonium salt is a compound according to the formula:



wherein

n is an integer having a value of at least 2.

6. An aqueous disinfecting and cleaning concentrate composition consisting essentially of, per 100%wt:

a disinfecting effective amount of a quaternary ammonium compound having germicidal properties;

0.01-10%wt. of a nonionic surfactant compound which is based on a polymeric alkylene oxide block copolymer;

0.01 – 10%wt. of a further nonionic surfactant;

0 – 3%wt. of a builder;

0 - 5%wt. of one or more conventional additives; and

water up to 100%wt.

7. An aqueous disinfecting and cleaning concentrate composition according to claim 6 which per 100%wt. consists essentially of:

a disinfecting effective amount of a quaternary ammonium compound having germicidal properties;

1 - 6%wt. of a nonionic surfactant compound which includes as a major portion of the molecule block polymeric alkylene oxide block;

1 - 8%wt. of a nonionic surfactant compound based on an alkoxylated alcohol;

0.001 - 1%wt. of a builder;

0% to about 5%wt. of one or more conventional additives selected from the group which includes coloring agents, fragrances and fragrance solubilizers,

viscosity modifying agents such as thickeners, pH adjusting agents and pH buffers including organic and inorganic salts; and,
water to 100%wt.

8. An aqueous disinfecting and cleaning concentrate composition according to claim 7 which per 100%wt. consists essentially of:
a disinfecting effective amount of a quaternary ammonium compound having germicidal properties;
1 - 6%wt. of a nonionic surfactant compound which includes as a major portion of the molecule block polymeric alkylene oxide block;
1 - 8%wt. of a nonionic surfactant compound based on an alkoxylated alcohol;
0.1 - 2%wt. of a polymeric cationic surfactant compound based on a polyquaternary ammonium salt,
0.001 - 1%wt. of a builder;
optionally up to about 5%wt. of one or more conventional additives selected from the group which includes coloring agents, fragrances and fragrance solubilizers, viscosity modifying agents such as thickeners, pH adjusting agents and pH buffers including organic and inorganic salts; and,
water to form 100%wt.

9. An aqueous composition which comprises 1 part of the aqueous disinfecting and cleaning concentrate composition per 10 to 64 parts water.

10. A process for cleaning and/or disinfecting of hard surfaces which comprises the step of:
applying an effective amount of a composition according to claim 1 to the surface.

INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/US 97/18873

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01N33/12 C11D3/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C11D A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 342 997 A (UNILEVER PLC ;UNILEVER NV (NL)) 23 November 1989 see page 2, line 39 - page 3, line 58; example 2 ---	1-3,5,6, 10
X	EP 0 691 397 A (CLOROX CO) 10 January 1996 see claim 1; examples ---	1-3,6,10
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of theinternational search	Date of mailing of the international search report
19 February 1998	11/03/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P B 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Grittern, A

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INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/US 97/18873

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